

R E M A R K S

The amendment to each of claims 1 and 5 involving "0.02 to 0.07% Al" is supported by original claims 1 and 5 and by Table 1-1 on page 23 and Table 1-2 on page 24 of the present specification (see particularly steel sheet no. 2 in Table 1-2). It is respectfully submitted that no new matter is introduced by said amendment.

The other amendments to claims 1 and 5 involve only editorial revisions.

The present claims are directed to a high tensile cold-rolled steel sheet consisting essentially of 0.04 to 0.13% C, 0.3 to 1.2% Si, 1.0 to 3.5% Mn, 0.04% or less P, 0.01% or less S, 0.02 to 0.07% Al, by mass, and a balance of Fe and inevitable impurities; having a microstructure containing 50% or larger area percentage of ferrite and 10% or larger area percentage of martensite, and having 0.85 to 1.5 of a ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction; and having a 8 GPa or larger nano strength of the martensite (see applicants' present claim 1).

The present claims also pertain to a method for manufacturing high tensile cold-rolled steel sheet, comprising the steps of: hot-rolling a steel slab consisting essentially of 0.04 to 0.13% C, 0.3 to 1.2% Si, 1.0 to 3.5% Mn, 0.04% or less P, 0.01% or less S, 0.02 to 0.07% Al, by mass, and a balance of Fe

and inevitable impurities, into a steel sheet, followed by coiling at a coiling temperature ranging from 450°C to 650°C; cold-rolling the coiled steel sheet at a cold-rolling reduction ranging from 30 to 70%; annealing the cold-rolled steel sheet by heating to a temperature range of [the coiling temperature + the cold-rolling reduction percentage x 4.5] to [the coiling temperature + the cold-rolling reduction percentage x 5.5] (°C); and cooling the annealed steel sheet to a temperature of 340°C or below at an average cooling rate of 10°C/s or higher (see applicants' present claim 5).

Claims 1 to 8 were rejected under 35 USC 103 as being unpatentable over JP 2002-226937 for the reasons set forth in item no. 6 on pages 3 to 6 of the Office Action.

It was admitted in the Office Action that JP 2002-226937 differs from applicants' claim 1 in that JP 2002-226937 does not disclose the ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction or the nano strength of the martensite.

One of the features recited in applicants' claim 1 that the Examiner admitted was not disclosed in JP 2002-226937 is as follows:

"having 0.85 to 1.5 of ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction."

The aforesaid feature is an important feature of applicants' claim 1 for the reasons set forth in item 2-3 bridging pages 12 and 13 of the present specification. The advantageous results of said feature are pointed out on page 13, lines 18 to 25 of the specification, which is reproduced as follows:

"...when the ratio of intervals of martensite is between 0.85 and 1.5, and is close to 1, that is, when there is not much difference between the intervals of phases in the sheet thickness direction and those in the rolling direction, the migration of dislocation is suppressed by the martensite, which increases the amount of accumulated dislocation to increase the deformation stress, thereby improving the crashworthiness. In addition, the elongation also increases because the distribution of martensite becomes relatively uniform."

It was admitted in the Office Action that JP 2002-226937 differs from applicants' claim 5 in that JP 2002-226937 does not teach the formula of the annealing temperature range recited in applicants' claim 5.

The feature recited in applicants' claim 5 that the Examiner admitted was not disclosed in JP 2002-226937 is as follows:

"annealing the cold-rolled steel sheet by heating to a temperature range of [the coiling temperature + the cold-rolling reduction percentage x 4.5] to [the coiling temperature + the cold-rolling reduction percentage x 5.5] (°C)."

It is stated on page 5, lines 9 to 10 of the Office Action that column [0041] of JP 2002-226937 discloses that a cold-rolled steel sheet therein is annealed by heating to a temperature range of 650 to 950°C and that this temperature range encompasses the specific examples of annealing temperature ranges recited in Table 2-2 of the present application. Applicants' reply to this position is as follows.

It is respectfully submitted that each of the annealing temperature, lower limit and upper limit provided by the formula to determine the annealing temperature range set forth in applicants' claim 5 is an optimum pin-point temperature and is therefore not obvious.

All the specific examples in Table 3 of JP 2002-226937 ("JP '937") do not fulfill the annealing temperature range of applicants' present claim 5. In this regard, see the following Table which includes (i) coiling temperature ("CT") values and cold-rolling reduction % ("CR") values from Table 3 of JP 2002-226937 (see the values under the heading "Table 3 of JP'937") and (ii) the lower and upper limits for the annealing temperature when the CT and CR values under the heading "Table 3 of JP'937"

are inserted in the formula for the annealing temperature range recited in applicants' claim 5.

	Table 3 of JP'937			Instant claim 5	
	Coiling temperature	Cold - rolling reduction %	Annealing temperature	Lower limits of An	Upper limits of An
No.	CT	CR	An	CT+CR*4.5	CT+CR*5.5
1	680	70	880	995	1065
2	690	65	800	982.5	1047.5
3	600	65	820	892.5	957.5
4	600	65	650	892.5	957.5
5	<u>695</u>	65	760	987.5	1052.5
6	580	62	720	839	921
7	620	62	760	899	961
8	<u>395</u>	60	820	663	725
9	<u>390</u>	55	780	597.5	652.5
10	<u>600</u>	<u>80</u>	840	960	1040
11	<u>670</u>	62	720	949	1011
12	<u>680</u>	62	770	959	1021
13	<u>660</u>	68	840	966	1034
14	550	60	760	820	880
15	<u>655</u>	60	700	925	985
16	600	70	790	915	985
17	<u>750</u>	70	645	1065	1135

Applicants have informed the undersigned that the aforesaid important feature of claim 5, namely "annealing the cold-rolled steel sheet by heating to a temperature range of [the coiling temperature + the cold-rolling reduction percentage x 4.5] to

[the coiling temperature + the cold-rolling reduction percentage x 5.5] ( $^{\circ}\text{C}$ )," contributes to obtaining the aforesaid important feature of claim 1, namely "having 0.85 to 1.5 of ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction" would not be obtained.

It is therefore respectfully submitted that one of ordinary skill in the art would not arrive at the presently claimed invention and the advantageous results obtained therefrom based on the disclosure of the reference.

Withdrawal of the 35 USC 103 rejection is respectfully requested.

Reconsideration is requested. Allowance is solicited.

An INFORMATION DISCLOSURE STATEMENT is being filed concomitantly herewith.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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Encs.: (1) PETITION FOR EXTENSION OF TIME  
(2) INFORMATION DISCLOSURE STATEMENT